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ABSTRACT

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CHILDREN WITH A PERSEVERATIVE TEXT INTERPRETATION STRATEGY: THE EFFECT OF TEXT ORGANIZATION

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Abstract

Twelve fifth-and sixth-grade students were located who had much greater difficulty understanding "inductively structured" paragraphs (with the main idea near the end) than understanding "deductively structured" paragraphs (with the main idea near the beginning). Compared to other students of equal overall reading ability, these students had difficulty in two other tasks: (1) Understanding paragraphs that required changing an initial impression and (2) Finding a word to fit a list of attributes when the most definitive attribute was last in the list. The results support the hypothesis that there is a group of reading disabled children who can be characterized as using a fixed-hypothesis text interpretation strategy and who have difficulty with inductive organizational structures that are common in texts written for children.

CHILDREN WITH A PERSEVERATIVE TEXT INTERPRETATION STRATEGY: THE EFFECT OF TEXT ORGANIZATION

Susan Kimmel and Walter H. MacGinitie

The reading comprehension process has been viewed in recent literature within a framework of hypothesis testing (Collins, Brown, & Larkin, 1977; Rubin, 1977). That is to say, in order to derive meaning from text the reader must construct tentative hypotheses for what the material will be about. The reader must go through an active process of evaluation and test various possible interpretations of the text. The reader must finally construct a plausible model that takes into account all of the details in the text. If a promising interpretation fails to account for some aspect of the text, one has the options of accepting the interpretation as adequate in spite of its flaws or rejecting it as inadequate and searching for other possible interpretations. Thus, a basic process in comprehension is testing plausible hypotheses and evaluating goodness of fit. A reader appears to comprehend a text when he or she is able to find a configuration of interpretations that offers a coherent account for all of the different aspects of the text. To the degree that a reader fails to find such a set of interpretations, the text will seem incomprehensible.

The model that a reader constructs for a text is based upon what has been termed "schemata" in the literature on information processing. A schema is an abstract description of a thing or an event. It characterizes the typical relationship among its components and contains a slot for each component that can be instantiated (Pichert & Anderson, 1977). Schemata exist for generalized concepts that underlie objects, situations, and events. We say that a schema "accounts for" a situation whenever the situation can be interpreted as an instance of the schema (Rumelhart &

Ortony, 1977). Interpreting a message, according to schema theory, involves a matching of information in the message to the slots in the schema. The information entered into the slots is said to be subsumed by the schema.

Pichert and Anderson (1977), for example, asked college students to take different perspectives on a story. One passage that the subjects were asked to read was a story about two boys who are playing hooky from school and decide to explore one of their homes. The subjects were all asked to read the same story, but one third of them were instructed to read the story from the perspective of a potential home-buyer, one third were to read it from the perspective of a burglar, and one third were given no special perspective. The authors proposed that a burglary would contain a loot subschema. Since the three bicycles and Dad's famous paintings mentioned in the story could be considered loot, the authors hypothesized that these items were likely to be entered into slots in the loot subschema and become part of the instantiated representation in memory for the story. On the other hand, the leaky roof mentioned in the passage cannot be subsumed by a loot subschema (or other subschemata related to a burglary). The subjects' recalls in the study varied according to the original perspective taken. Subjects in each group noted and retained information that was most relevant to the perspective taken.

The general form of this theory of information processing is that high-level schemata provide the "ideational scaffolding" (Ausubel, 1963) for anchoring elements in text. Whether or not a detail will be sufficiently processed to be remembered (or reconstructed in recall) depends upon whether there is a niche for it in the structure. In line with this interpretation, the effects of perspective found by Pichert and Anderson were a result of different high-level schemata providing slots for the different kinds of

information contained in the text.

The application of schema theory as a framework for recall of information in text has led to a consideration of the reading comprehension process from the same point of view. One view of the comprehension of text is that it is a top-down or conceptually-driven process (Adams & Collins, 1977; Anderson, Spiro, & Anderson, 1977; Ausubel, 1963). Rather than analyzing a text component by component, the reader formulates possible hypotheses for the meaning of the text and undergoes a process of accepting or rejecting those hypotheses. According to this view, reading is conceived of as a "psycholinguistic guessing game" (Goodman, 1976). The reader's expectations about the content of a text represent a form of preprocessing that should make subsequent analysis more efficient.

Another view of reading comprehension proposes that reading is a bottom-up process, one that is data driven (Bobrow & Norman, 1975). According to this view there is a series of processing stages, each corresponding to a level of linguistic analysis. The processing begins with an analysis of letter features, combines information to identify words, and constructs the meanings of combinations of words.

A third, interactionist, view of reading comprehension emphasizes that both top-down and bottom-up processes are necessary (Rumelhart, 1976). The reader obtains information from an analysis of the initial portions of the text and constructs hypotheses that guide further analysis. Often, even the initial analysis is guided by the reader's goal or by expectations based on the situational context (Kintsch, 1979).

Spiro (1979) has proposed that some poor readers develop a particular approach to the task of comprehension that over-emphasizes either top-down or bottom-up processes. He proposes that some readers tend to use more

"knowledge-based" processes while others rely on more "text-based" processes. The top-down, or knowledge-based, reader relies too much on world knowledge and on hypotheses based upon earlier portions of the text. The bottom-up, or text-based, reader relies too much on details in the text and fails to use world knowledge to guide text processing and to provide a framework for constructing the meaning of the text.

There appears to be a number of children whose reading comprehension problems represent a particular type of overemphasis on top-down processing. In order to derive meaning from text, a good reader constructs tentative hypotheses about the meaning of the text that has been read and about the content yet to come. The hypotheses remain tentative until all of the related information has been accounted for. The reader then constructs a plausible model that takes into account all of the details in the text. One particular type of poor reader forms hypotheses but fails to evaluate and modify them appropriately on the basis of subsequent text. Specifically, these readers tend to formulate at the outset an hypothesis about the meaning of the text, then hold on to that interpretation rigidly in spite of disconfirming information in the later text. Instead of testing this interpretation against all of the new information as they read, these readers remain so inflexible that they may misperceive details in the text, conforming them to the original interpretation rather than changing the interpretation.

It is the purpose of the present study to show that there is a group of children with a reading comprehension disability who can be characterized as inflexible in their reading comprehension strategy and to explore the effects of this inflexibility on the comprehension and recall of texts. A second purpose is to show that certain organizational structures, or "formulas"

frequently used in writing for children are very difficult for this group of readers to comprehend.

Through careful reading of a great many children's texts from grade levels 3 to 6, it became apparent that many of the passages were written in a kind of inductive style. That is, initial sentences are used to lead up to the main point of a paragraph; the main point itself may be stated at the end. There are several types of these inductive formulas. These types include:

(1) Negation--paragraphs in which a belief or idea is stated in the beginning of the paragraph and later said to be false.

(2) Analogy--paragraphs in which the topic--a thing, fact, or idea--is explained by comparing it with another thing, fact, or idea, the analog. There are two subtypes: Direct Analogies and Opposite Analogies. In a Direct Analogy, the similarity between the topic and the analog is described. In an Opposite Analogy, a contrast between the topic and the analog is described. If the analog is mentioned first in the paragraph, the inflexible reader is likely to construct a meaning that focuses on the analog and omits or merely appends the topic.

(3) Examples-Topic (Explicit)--paragraphs in which instances of a topic are stated followed by a concluding statement of the topic that is supposed to tie the paragraph together.

(4) Examples-Topic (Implicit)--paragraphs in which instances of a general topic are given, but the unifying topic is not explicitly stated.

Examples of the four types of formulas follow:

Type (1): Negation

Perhaps you have heard someone say that people live on Mars, that the planet is inhabited. You may have heard someone talk about men from Mars who were supposed to have come to Earth in space ships called flying saucers. People have had such imaginative notions about traveling Martians off and on for centuries. As far as we know, there has never been any evidence to support such beliefs. (O'Donnell & Cooper, 1973, p. 43).

Type (2): Analogy

When people overwork, they get very warm and perspire. This helps make the body cooler. Birds, however, don't perspire through their skins. Heat and water leave their bodies through their mouths. When they are very hot, they open their mouths and breathe fast to get rid of heat. (Boning, 1976, Level E, Unit 4).

Type (3): Examples-Topic (Explicit)

In a steamy forest, far on the other side of the world, huge elephants are pushing heavy logs. On top of the world dogs are running over deep snow, pulling loaded sleds behind them. And across far-off deserts camels sway, carrying folded tents and goods for trade. All over the world animals are moving loads for people. (Fay, Ross, & LaPray, 1978, p. 20).

Type (4): Examples-Topic (Implicit)

Usually the bones of birds' wings are hollow. This gives the bones strength without weight. The surface of the wing is curved. The fact that the front edge of the wing is thicker than the rear edge also makes for easier flight. (Boning, 1976, Level D, Unit 2).

Deductively organized paragraph structures are also common in children's texts. These deductive structures appear to be much easier for children who use a perseverative text interpretation strategy (and perhaps for many good readers, too) to understand, for the reader's first hypothesis about the main point of the paragraph is more likely to be correct. Four such structures are reversed variants of the Examples-Topic formula.

(A) Topic-Examples--paragraphs in which a topic is introduced at the beginning of the paragraph and followed by examples of different types.

(B) Topic-Details--paragraphs in which a concept (e.g., object, place, person) is named at the beginning and followed by details that describe it.

(C) Whole-Part--paragraphs in which a whole object or idea is named at the beginning and followed by descriptions of its various parts.

(D) Statement-Reasons--paragraphs that begin with a statement of a fact or idea and continue with sentences that give reasons or explanations to support the statement.

The following are examples of these deductive types of paragraph structures:

Type A: Topic-Examples

> Communities can be different in many ways. There are communities with many people in them. These are called cities. Some cities cover lots and lots of land. Other cities have little land. Most cities are built near an ocean or river. In some communities there are fewer people. These communities may have farms around them. They are called towns. (Van Roekel & Kluwe, 1973, p. 12).

Type B: Topic-Details

> There is a strange little worm in South American called the railroad worm. This little animal looks as if it is divided into parts. A light is on each part. When we look at the worm at night, it looks like a number of lighted train windows. (Boning, 1976, Level D, Unit 3).

Type C: Whole-Part

> In any forest, there are hundreds and sometimes thousands of living things which are related to one another. There are plants, vines, herbs, mosses, shrubs, ferns, and mushrooms which grow in the forest. There are also hundreds of different kinds of animals. One can find birds, insects, reptiles, and mammals living in the forest. (O'Donnel & Cooper, 1973, p. 71).

Type D: Statement-Reasons

> There are many reasons why cattle stampede—a clap of thunder, the howl of a coyote, a flash of lightning, the firing of a six shooter, the sight of a buffalo. Once started, the blind, mad, terrible rush is a frightening thing to see. (Boning, 1976, Level D, Unit 4).

It would be expected that readers who perseverate in applying an initial unconfirmed text interpretation would show better comprehension of deductive paragraph structures than of inductive paragraph structures.

Part I - Group Screening

Method

Subjects included all available students in the fifth and sixth grade at a parochial school in a middle-class suburban community near New York City. One hundred sixty-one subjects participated.

A screening instrument was developed to locate children who perseverate in text interpretation. The instrument consisted of 48 short expository passages, three to four sentences in length, drawn from published children's reading texts of approximately fourth grade reading level. There were 24 paragraphs written in a deductive style and 24 paragraphs written in an inductive style, sequenced randomly with the restriction that no more than three of the same type occurred in sequence. The paragraphs included all of the variations in structure outlined above (Negation, Analogy, Examples-Topic (Explicit and Implicit) for inductive paragraph structures and the four variants of Examples-Topic for deductive paragraph structures). Each paragraph was followed by a multiple-choice question that asked for the main idea of the paragraph. The questions appeared on the page following the paragraph.

The subjects were given the 48 paragraphs to read in their regular classroom groups. The 48 paragraphs were given in two sessions--24 on

each of two consecutive days. Directions were read to the children and two sample paragraphs and questions following them were discussed. The children were instructed not to look back once they had finished reading each paragraph. They were also told to ask for assistance in reading any difficult words. The children proceeded at their own pace until all paragraphs and questions were completed.

Results. The Kuder-Richardson Formula 20 reliability of the subset of 24 Deductive items was .875, the reliability of the subset of inductive items was .821, and the intercorrelation of the raw scores on the two subsets of items was .720. The reliability of the Deductive-Inductive difference score was estimated from these values as .467. The number right on the Deductive paragraphs and the number right on the Inductive paragraphs were calculated for each student and converted to a regressed standard score. The 12 children with the largest difference score (many more errors on inductive paragraphs) were selected for further study.

Part II - Individual Assessment

Method

The children selected on the basis of large difference scores were tentatively identified as the Perseverative Group. A Comparison Group was formed by individually matching other children with children in the Perseverative Group on the sum of their regressed standard scores for the deductive paragraphs and the inductive paragraphs. Each child selected for the Comparison Group had a regressed standard score on the inductive paragraphs that was as similar as possible to his or her own regressed standard score on the deductive paragraphs. Thus, the Comparison Group had an overall reading ability on the test materials equal to that of the Perseverative Group but did not show any tendency to have particular

difficulty with inductively structured text. Table 1 shows the results of this matching.

Table 1

Mean Regressed Standard Scores of Children in the Perseverative and Comparison Groups on Two Types of Paragraph Structure

Group	Deductive Paragraphs	Inductive Paragraphs	Deductive Minus Inductive	Deductive Plus Inductive
Perseverative	53.974	40.106	13.868	94.080
Comparison	46.536	47.088	-0.553	93.624

Materials. Three tasks were used in the individual assessment of the subjects in the Perseverative and Comparison Groups.

Task 1--Ten paragraphs were constructed with the intention of misleading readers who tend to perseverate in applying an initial unconfirmed text interpretation. Each paragraph was designed to evoke a plausible hypothesis at the beginning of the text and eventually make it clear that another interpretation was necessary. The paragraphs thus encouraged the reader to formulate hypotheses at the outset and then required the reader to change those hypotheses in order to construct a reasonable interpretation for the entire paragraph. The following is an example of one of these twelve paragraphs:

> It was the first day of school. Teddy seemed a bit nervous. Mom took him to school just the same. We were all pleased that Teddy was going. We knew it would do him a lot of good to learn new things. It was important that Teddy be trained properly for the show next Spring. A prize at the dog show would make the whole family proud of Teddy. And this school was highly recommended.

Each of the ten paragraphs was followed by a multiple choice question that tested whether the incorrect interpretation that was encouraged in the beginning had been appropriately revised by the time the entire paragraph had been read. For example, the following question was asked after the paragraph above:

Where is Teddy going today?

a) to an elementary school
b) to a show
c) to a dog show
d) for a walk

Task 2—Each child was given four of the original inductive paragraphs to read silently. After each paragraph, the child was asked to tell the examiner what the paragraph was about. The recalls were recorded on a portable cassette player. In addition, the recalls were probed by the examiner in order to clarify the nature of the child's understanding.

Task 3—The subjects were given an adaptation of a "children's word-finding test" developed by Pajurkova, Orr, Rourke, and Finlayson (1976). Pajurkova, et al., developed this test to discriminate between a group of nine- and ten-year old learning disabled children and a normal comparison group. In the adaptation constructed for the purposes of this study, each word-finding item was a paragraph consisting of four sentences each containing the nonsense word grobnick. The child's task was to read the four sentences silently and name the real word that could be substituted for the nonsense word. Twenty such paragraphs were constructed. Ten of these paragraphs were written in an "inductive" version and ten in a "deductive" version. In an "inductive" version, the initial sentence gave a general characteristic of the target word-concept--a characteristic that could apply to many other word-concepts. The other three sentences then

presented progressively more criterial characteristics. The following is an example of an item written in an "inductive" version:

> Every school has grobnicks. You can learn from a grobnick. A grobnick can make you a better reader. A grobnick can give you homework.

In a "deductive" version, the most criterial characteristic was presented first; the other characteristics followed. The following is the same item as above written in a "deductive" version:

> A grobnick can give you homework. Every school has grobnicks. You can learn from a grobnick. A grobnick can make you a better reader.

In the actual task, only one version ("deductive" or "inductive") of any given item was used. The deductive versions were included to keep the children from establishing a strategy of rejecting the most likely first guess.

Procedure. Each of the students in the Perseverative and Comparison Groups was tested individually. In the first session, the students were given the ten "misleading" paragraphs of Task 1 to read silently. The corresponding multiple choice questions were on separate pages following each paragraph. The students were not permitted to look back at the paragraph when answering the question. Next, they were given the paragraphs in Task 2 to read silently and recall. Recall followed the reading of each paragraph. The students were asked to tell the examiner what they could remember about each paragraph, what it was about. In the final session, the students were given the items in Task 3, the adaptation of the children's word-finding test. The items were presented in the same random sequence to all students. After reading each item silently, the student told the examiner what he or she thought a grobnick was, and the examiner recorded the response.

Results

A t-test was performed on the paired scores of the Perseverative and Comparison Groups on the ten Task 1 paragraphs. The results showed a significant difference in favor of the Comparison Group ($t(22)=2.48$; $p < .05$).

The recalls of the Inductive passages (Task 2) were analyzed for each of the subjects in the Perseverative and Comparison Groups. The purpose of the recall analysis was to determine if readers with a perseverative interpretation strategy tend to stage main idea information later in their recalls of inductively structured paragraphs than do matched Comparison subjects (or leave out main idea information entirely). A word or group of key words that was central in expressing accurately the main idea of the paragraph was determined for each of the paragraphs. For each recall, the number of words preceding the key words and the total number of words in the recall were both counted, and the proportion of words preceding the key words was calculated. If the key words did not appear at all in the students' recall, the proportion was assigned a value of 1.00. For statistical analysis, the proportions were converted to arc sin values. A difference score (between arc sin values) for the matched pairs of students in the Perseverative and Comparison Groups was calculated for each paragraph individually and for the set of four paragraphs. There was a significant difference in the predicted direction ($t(22)=2.31$; $p < .05$) in the location of the main idea information in the case of only one of the four paragraphs. The difference for the set of four paragraphs was not significant.

A t-test was performed on the paired scores of the Perseverative Group and Comparison Group students on the "inductive" word-finding items

of Task 3. The results showed a significant difference in the performance of the Perseverative and Comparison Groups ($t(22)=2.73$; $p < .01$).

Discussion

The results of this study support the hypothesis that there are readers who use a perseverative text interpretation strategy. The twelve subjects who had the largest difference scores on the screening test performed on Task 1 and Task 3 as if they were consistently using such a strategy. The lack of a significant effect on recall in Task 2 may have been due to the instructions given to the subjects for recall. The instructions were not specific enough, and often resulted in a short summary statement rather than a full recall. In such a summary statement, the relative location of the key words of the main idea is probably not a good indication of the importance assigned to the idea by the student.

It is important to note that the screening instrument in the pilot study used paragraphs actually drawn from children's texts. The paragraph structures, or "formulas," discussed earlier, that tend to mislead children who use such a perseverative strategy, are commonly found in material that children are expected to read in school.

It seems likely that many students who use a perseverative text interpretation strategy might be taught to evaluate their initial hypotheses as they continue reading. One possible approach to such instruction might be to give the child guided practice in recognizing the various inductive text organization "formulas" that give the student particular difficulty. Informal work with a few students suggests that some can fairly readily learn to recognize and respond appropriately to Negation formulas that begin with "some people think that...," or some similar form.

If children with a perseverative text interpretation strategy can learn more flexible reading strategies, the work reported here has considerable promise, for a screening instrument for locating such children is now available. While the instrument has only modest reliability at present, it can readily be lengthened and can be refined on the basis of current item data. One possibility that needs to be explored is that the various inductive formulas define distinct subtests within the screening instrument; it is possible that some children with a perseverative text interpretation strategy find one or more of the formulas particularly difficult relative to the others.

Indeed, one must not conclude prematurely that the group identified by the screening instrument is a unitary group with a single type of reading strategy. While the Perseverative Group did significantly worse than the Comparison Group on both the misleading passages and the "inductive" word-finding items, there was considerable variability within the Perseverative Group. One question that needs further exploration is the range of tasks to which particular children apply a perseverative strategy. Informal investigation suggests that at least some of the children in the Perseverative Group apply the perseverative strategy when they listen to written language that is read <u>to</u> them. Some of the children may extend the perseverative strategy to problem solving in other domains. The nature of the perseverative strategy (or strategies) itself needs further exploration leading to a better theory of this type of behavior.

It is important to realize as well, that there were also some children who did <u>relatively well</u> on the inductively structured paragraphs of the screening instrument. The reading strategies of these children have not yet been studied. Presumably they are children who reserve judgment and

are able to remember and keep tentative their possible interpretations until they are able to construct a model of the entire paragraph that best fits some particular set of possible interpretations. Again the range of tasks to which they might extend this strategy is an important question.

One speculative but intriguing way of thinking about the children who use a perseverative strategy and those who are relatively extreme in reserving judgment is to note that their success in laboratory tasks, school, and life will depend on the extent to which performance on the tasks they encounter is facilitated or hindered by the particular strategy the children consistently follow. If all the paragraphs in a test, or task, or life begin with a topic sentence, the children who use a perseverative strategy might do relatively well. It will be important to study how well children, whose past experiences has led them to use a given strategy too consistently, can learn to be more flexible in choosing a strategy that is most appropriate for the task.

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